ABSTRACT OF THE DISCLOSURE

Improved carrier recovery, symbol timing, and carrier phase tracking systems and methods suitable for use in connection with a dual-mode QAM/VSB receiver system are disclosed. Carrier and phase recovery systems operate on complex signals representing symbols having the same time stamp for each phase error term. in-phase signals are sampled twice a symbol at the in-phase symbol sampling time and at the quadrature-phase symbol sampling time. The signals are de-multiplexed to generate I and X_I data streams, where I represents the in-phase sampling time signals and X_I represents mid-symbol point sample times. A similar procedure is carrier out on quadrature-phase signals. When the in-phase signal is de-multiplexed to generate a symbol I, the quadrature-phase signal is de-multiplexed to generate its mid-symbol point X_Q. Both I and Q are decoded in a decision device to define a symbol error term, which is combined with the opposite mid-symbol signal to define a phase error term P_I and P_Q for each rail. In both cases, the symbol (I) decision ($\hat{I}$), and mid-symbol (X_Q) in each phase error term (P_I) computation will have the same prime index.